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(54) Abstract Title
**Use of tags to identify components of products for recycling**

(57) Dismantling a multi-component product (e.g. car, domestic white goods) having a machine-readable data tag, e.g. RFID tag, attached to at least one of the components. When each component is removed, S2, it is determined whether there is a tag present, S4. If not, a blank tag is attached to the component, S18, and component and product identification information is written thereto, S24. If there is a tag present, the data stored thereon is read and, if valid, is used to extract further data, S14, from a database 16. The tag data and/or further data may include specific dismantling instructions. A component identification record S26 is created and may be used for reporting purposes 28; this record also specifies whether the component requires further dismantling, is reusable or recyclable. The components may be stored in dedicated storage receptacles, S30, described, and a storage record 32 may be maintained for each component. The identification records 28 and/or storage records 32 may be used to monitor the movement of components between sites.

Also disclosed is a separating apparatus (Fig. 3), comprising a conveyor belt with an optical sensor, RFID tag readers and deflection means to deflect the components into appropriate receptacles.

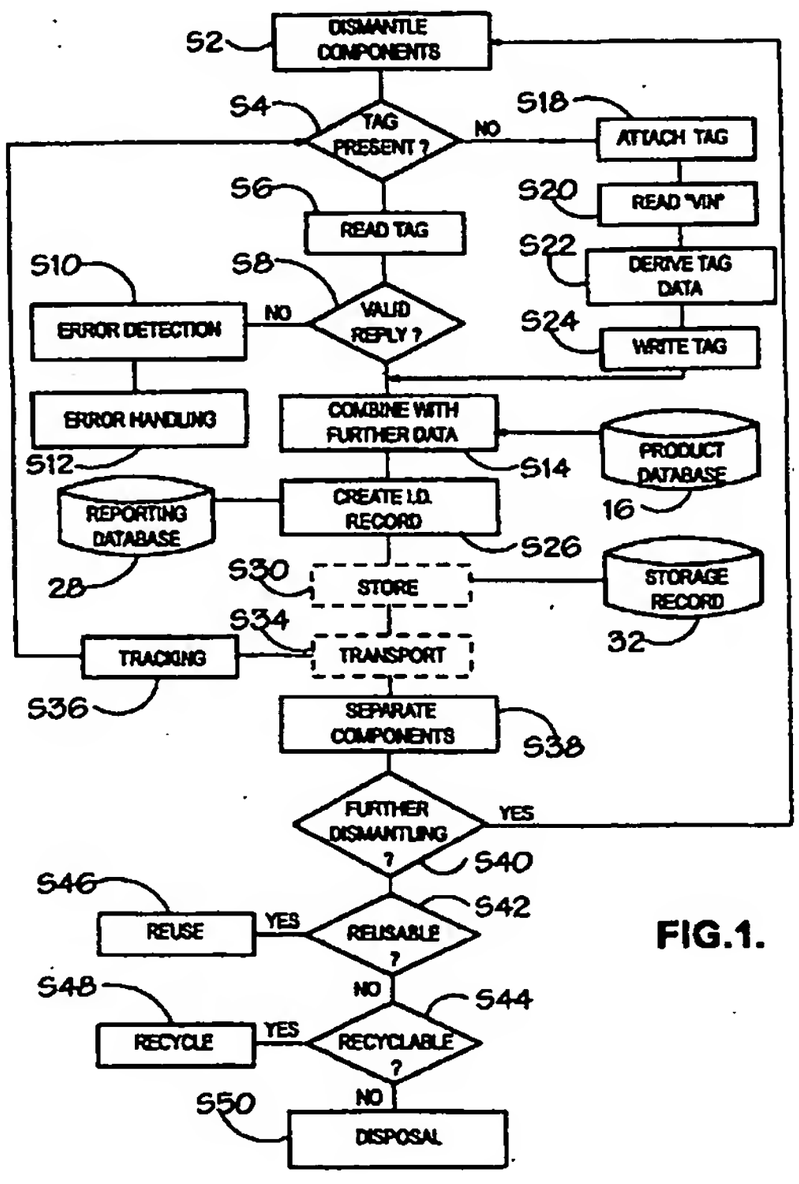


FIG.1.

GB 2 366 430 A

The claims were filed later than the filing date but within the period prescribed by Rule 25(1) of the Patents Rules 1995.

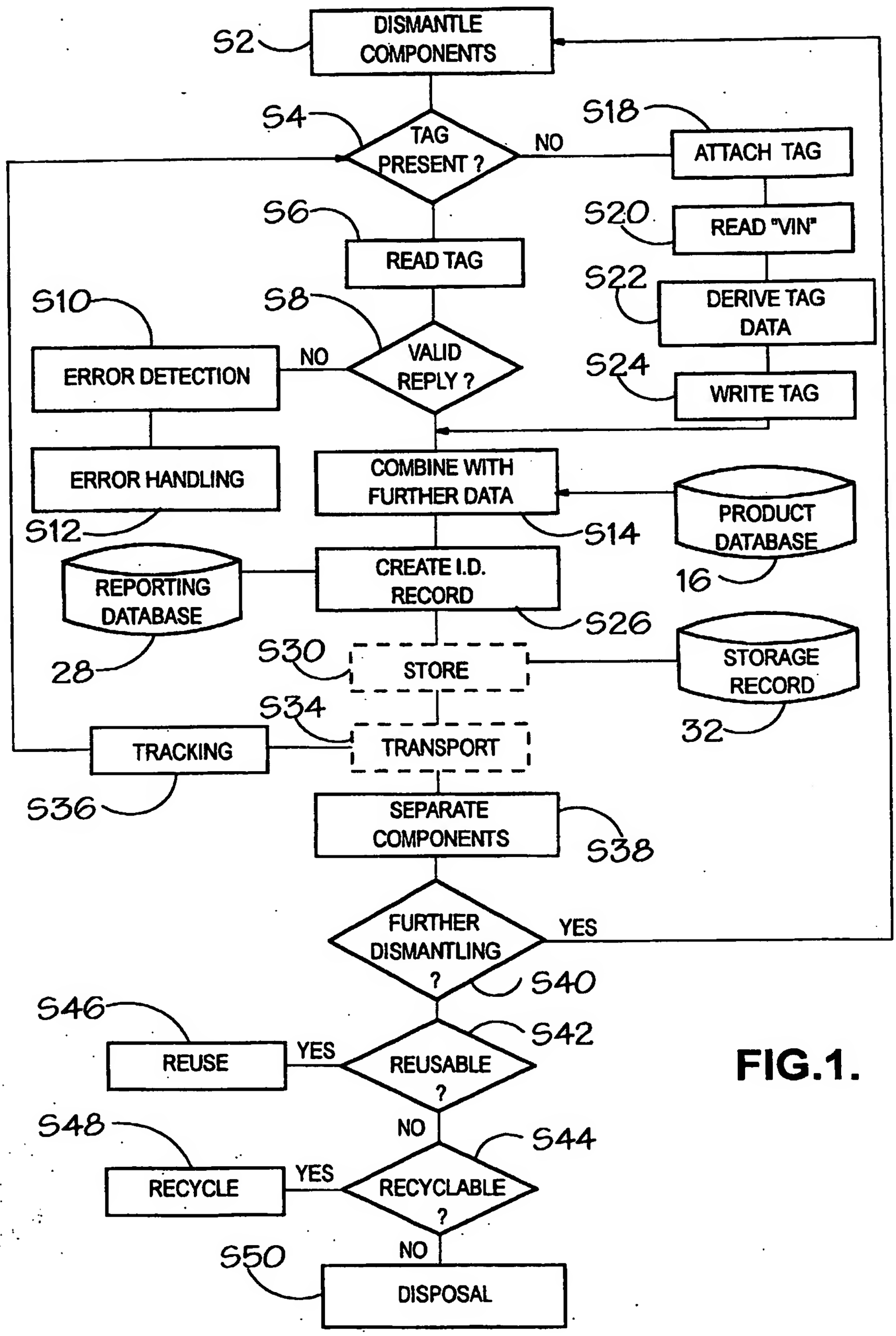
S2
DISMANTLE COMPONENTS
S4
TAG PRESENT ?
NO
S18
ATTACH TAG
S20
READ "VIN"
S22
DERIVE TAG DATA
S24
WRITE TAG
S6
READ TAG
S8
VALID REPLY ?
NO
S10
ERROR DETECTION
ERROR HANDLING
S12
COMBINE WITH FURTHER DATA
S14
PRODUCT DATABASE
16
REPORTING DATABASE
28
CREATE I.D. RECORD
S26
S30
STORE
STORAGE RECORD
32
S34
TRANSPORT
TRACKING
S36
SEPARATE COMPONENTS
S38
FURTHER DISMANTLING ?
YES
S40
S42
REUSABLE ?
YES
REUSE
S46
NO
S44
RECYCLABLE ?
YES
RECYCLE
S48
NO
S50
DISPOSAL

FIG.1.

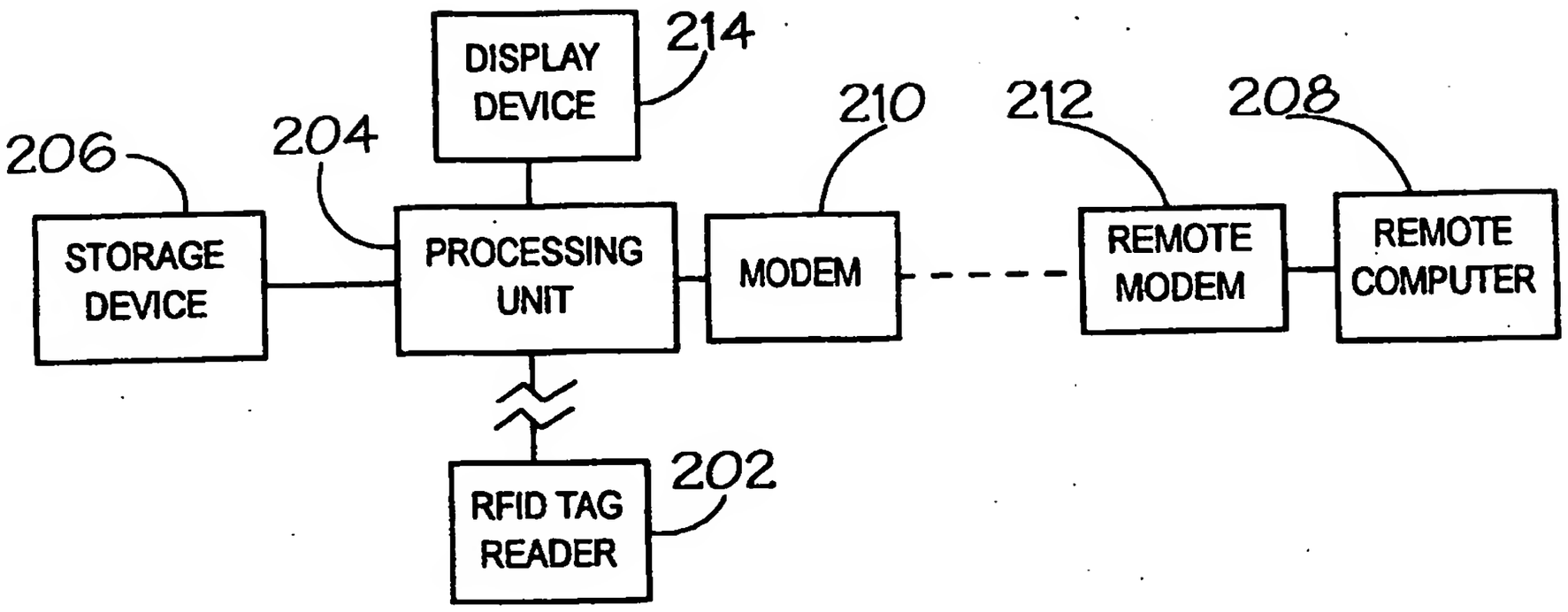
DISPLAY DEVICE
214
206
204
210
212
208
STORAGE DEVICE
PROCESSING UNIT
MODEM
REMOTE MODEM
REMOTE COMPUTER
RFID TAG READER
202

FIG.2.

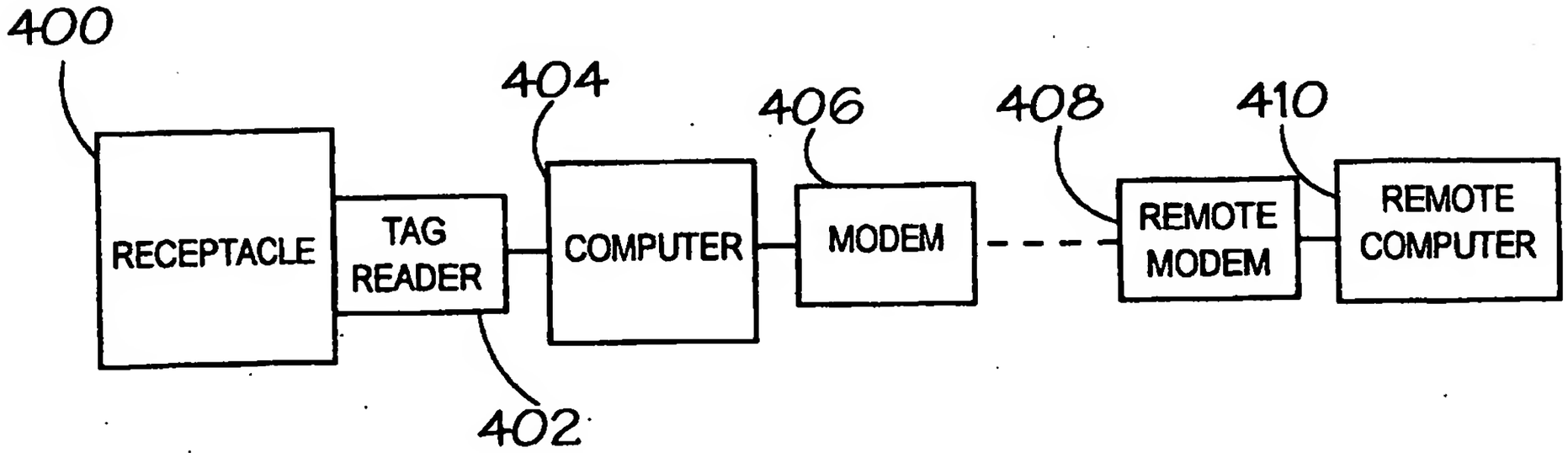
400
404
406
408
410
RECEPTACLE
TAG READER
COMPUTER
MODEM
REMOTE MODEM
REMOTE COMPUTER
402

FIG.4.

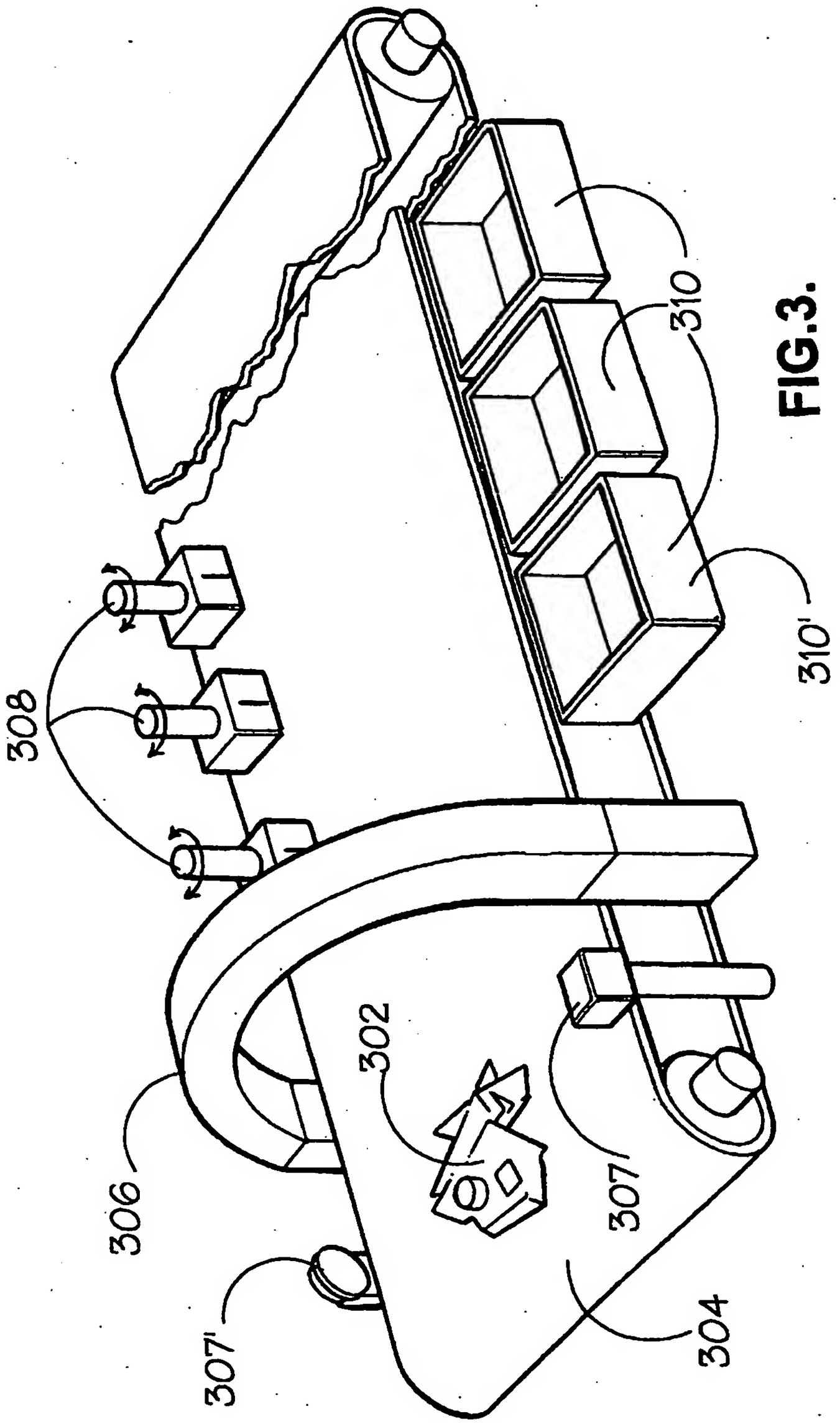


FIG.3.

# DESCRIPTION

## METHODS AND APPARATUS FOR RECYCLING

The present invention relates to the recovery/recycling of components/materials from end of life vehicles, domestic white goods, etc. In particular, the invention relates to a method of identifying components and materials within end of life, multi-component machines, a method of manufacturing or adapting multi-component machines, a container for the storage of components removed from multi-component machines, an apparatus for sorting components, and computer programs for use in these methods and for controlling these apparatus.

At the end of the useful life of a vehicle or an appliance, it is often stored, for example by a scrap merchant, for a period during which certain re-usable components (e.g. body panels, wing mirrors, etc) are sold by the merchant to replace damaged components on vehicles or white goods which are still in use. What is left of the vehicle or the appliance is then crushed and shredded.

The shredded material is then separated into ferrous metals, non-ferrous metals and plastics. Some of the shredded material is recycled, but a proportion of it is sent to landfill. One problem with such recycling is that materials of different types and specifications are often mixed with each other. For example, a component made from a particular grade of material may be mixed with other materials to such an extent that the grade of material is contaminated, with the result that the recycled material is only thereafter fit for use in a lower grade, less

exacting application.

It has long been recognised that fuel and material resources are not limitless. International agreements have been reached relating to the re-use of materials and the saving of energy. The European Commission has proposed a directive on end of life vehicles which states as a fundamental principle that "waste should be re-used and recovered, and that preference be given to recycling" (recycling is later defined as "reprocessing in a production process of the waste materials for the original purpose or for other purposes excluding the processing for use as fuel or as other means of generating energy" - Article 2(7)).

The draft directive further states that:

- "in accordance with the polluter-pays principle and in order to implement the principle of producer responsibility, collection and recovery of end of life vehicles should no longer be a responsibility of public authorities and should be shifted to economic operators";
- "the requirements for dismantling, re-use and recycling of end of life vehicles should be integrated in the design and production of new vehicles";
- "the development of markets of recycled materials should be encouraged";
- "a certificate of destruction, to be used as a prerequisite to the deregistration of vehicles, should be set up";
- "producers should ensure that vehicles are designed and manufactured in such a way as to allow the quantified targets for re-use, recycling and recovery to be achieved"; and that

- "vehicle manufacturers and material producers should use common component and material coding standards" "in particular to facilitate the identification of those components and materials which are suitable for re-use and recovery".

Targets are given in the draft directive relating to the percentage by weight of vehicles which must be recovered, recycled or re-used by certain dates. These targets rise to 85%-95% no later than 1 January 2015.

One system which is currently in use to assist in the dismantling of vehicles and the identification of components and materials is the IDIS software, details of which may be found at the IDIS website - www.idis2.com. The IDIS software has been developed by a consortium of vehicle manufacturers to facilitate the recycling of end-of-life vehicles.

There are two IDIS packages: IDIS Office and IDIS Plant. IDIS Office is intended for vehicle manufacturers and it has features to enable the manufacturer to produce data and manuals relating to end-of-life vehicles. IDIS Plant is intended for the dismantlers of end-of-life vehicles and it has features which enable the dismantler to identify the materials from which parts of a vehicle are made.

A dismantler using this software will select the make and model of the vehicle that he is dismantling. He may then select an area of the vehicle, for example the dashboard. The software shows images of components of the vehicle and instructions for their removal. The software may be used to identify components which are made of a particular material or a particular class of

material. The software also gives information relating to the materials from which components are made. Other information, for example the weight of the components and the approximate time required for their removal, are also available.

The dismantler removes the components in the area selected using, where necessary, the instructions provided. The components may then be separated for recycling at the time of dismantling. The dismantler may then select another area of the vehicle and continue the dismantling operation.

However, the IDIS software at present only identifies components made from plastics materials. It is therefore of limited use, particularly in reaching targets set on the basis of percentage weight of vehicles. It also relies on the visual identification of components and requires input from a dismantler relating to the make and model of the vehicle, etc.

Existing dismantling operations might continue to remove re-usable components selectively and shred and recycle what is left. However, this process is inefficient and potentially valuable material compositions are lost by the indiscriminate shredding and reprocessing of waste.

Existing dismantling and recycling operations also suffer the disadvantage that documentation, if done at all, places an additional, time-consuming burden on the dismantlers.

It is an aim of the present invention to provide apparatus and methods to facilitate the more efficient dismantling of multi-component machines and

recovery/recycling/re-use of components and materials and to alleviate some or all of the other disadvantages associated with known methods.

The following terms shall be used with the meanings given here in this document:

"Re-use" shall mean the use of components of end of life vehicles, domestic white goods, etc for the same purpose for which they are conceived;

"Recovery" shall mean the reprocessing of components such that the compositions from which they are made are substantially unchanged or degraded minimally;

"Recycling" shall mean the reprocessing of components such that original material specifications are normally lost.

It will be seen that re-use and recycling are at the extreme ends of a continuous scale.

It will further be seen that the recovery of specific material compositions is preferable to the recycling of materials.

In accordance with a first aspect of the present invention, there is provided a method of identifying components and materials within end of life, multi-component machines comprising using a reading device attached to a first control means to read identification data from remotely machine-readable tags attached to at least one of the components, which data identifies the component from whose tag it was extracted.

Preferably, the identification data read from the tags may be used to extract

product data from a database.

Alternatively, the product data may be read from the tag by the reading device.

This has the advantage that the retrieval of data from a database, possibly at a remote location, is not required.

Preferably, line-of-sight between the tags and the reading device may not be necessary.

Preferably, the tags are of a type which may be stimulated to transmit the data stored thereon. For example, the tags may be RFID (radio frequency identification) tags.

Preferably, the product data comprises information relating to the intended purpose of the component and/or the materials from which the component is made and/or the shape of the component and/or instructions for removing the component from the machine and/or information relating to how the component is to be processed.

Preferably, some or all of the product data may be in a standard form. For example, the data representation may be in accordance with a published standard such as ISO standards ISO 10303 and/or ISO 13584. This confers the advantage that the database is independent of any particular computer system and will therefore have greater longevity.

Advantageously, some or all of the identification data and/or the product data may be displayed on a display device attached to the first control means.

Advantageously, the database may be stored on the first control means or on a medium readable by the first control means, for example, the database may be stored on a CD-ROM.

However, also advantageously, the database may be hosted on a remote second control means which the first control means may access by a dial-up connection, an intranet, the internet or some other network. This confers the advantage that it is not necessary to recirculate a database carrier (e.g. a CD-ROM) each time the database is updated.

In accordance with a second aspect of the present invention, there is provided a method of manufacturing or adapting multi-component machines comprising attaching to at least one of the components of the machine a respective remotely machine-readable tag which carries identification data identifying the component to which the tag is attached.

Preferably, the tag is of a type which may be read without line-of-sight being required. For example, the tag may be of a type which may be stimulated to transmit the data stored thereon, e.g. an RFID tag.

Advantageously, the identification data may be adapted to be used to extract from a database product data relating to the component to which the tag is attached.

Alternatively, the tag may further carry product data relating to the component to which the tag is attached.

Preferably, the product data comprises information relating to the materials from which the component is made and/or the intended use of the component

and/or instructions for removal of the component from the machine and/or information relating to how the component is to be processed.

In accordance with a further aspect of the present invention, there is provided a container for the storage of components removed from multi-component machines, comprising at least one reading means for reading identification data from tags attached to the components stored within the container.

Preferably the container further comprises, or is adapted to be attached to, a computer which is adapted to cause the at least one reading means to acquire identification data from the tags.

In accordance with a further aspect of the present invention, there is provided an apparatus for sorting components having tags attached thereto, comprising conveyor means for carrying the components past a first reading station comprising at least one first tag reading means for reading identification data from the tags attached to the components, the reading means being attached to a control means which is adapted to receive data from the tag reading means, and further comprising directing means controlled by the control means for causing the components to be directed according to data read from the tags.

Preferably, a plurality of reading stations and directing means is provided in series.

In accordance with a still further aspect of the present invention, there is provided a computer program for causing a first computer to execute the following steps:

acquiring identification data from at least one tag attached to at least one component of a machine; and

displaying on a visual display means instructions for removal of the at least one component from the machine and/or information regarding how the at least one component is to be processed.

Preferably, the program will further cause the first computer to use the data acquired from the at least one tag to extract selectively product data relating to the at least one component from a database.

Advantageously, the database may be stored on a central computer which the first computer accesses remotely. This remote access may be via a direct dial-up, a private network (e.g. an intranet), or a public network (e.g. the internet).

Alternatively, the computer program may further cause the first computer to acquire product data relating to the component from the tag.

In accordance with a further aspect of the present invention, there is provided a computer program for causing a first computer in a first location to interrogate at least one second computer in at least one second location;

to acquire from the at least one second computer information relating to items stored at the at least one second location; and

to schedule collection of the items from the second location and their delivery to the first location or to another location.

In accordance with a further aspect of the present invention, there is provided a method of processing a multi-component machine at the end of its useful

life, comprising reading identification data from a remotely machine-readable tag attached to at least one component of the machine, the data identifying the component and the machine to which the component belongs.

Specific embodiments of the invention will now be further described by way of example only and with reference to the accompanying drawings, in which:

Fig. 1 is a block diagram of a method of decommissioning vehicles and/or appliances in accordance with the present invention;

Fig. 2 is a block diagram of an embodiment of apparatus in accordance with the present invention;

Fig. 3 is a schematic representation of a sorting apparatus in accordance with an embodiment of the invention; and

Fig. 4 is a block diagram of a receptacle in accordance with an embodiment of the invention.

Referring to figure 2, when a vehicle or an appliance reaches the end of its life, it is taken to one of a number of decommissioning facilities. The vehicle or appliance is identified and the owner is issued with a decommissioning certificate, which may be used to prove that the vehicle or appliance has entered the decommissioning system. Vehicles may be identified using the VIN (vehicle identification number) which is marked on all vehicles, and the identity of the registered owner of the vehicle may be extracted from a database using this number. In the case of newer vehicles, the VIN may be read electronically from an onboard computer. Appliances may be identified using a serial number. The

vehicle or appliance is then dismantled.

For the sake of simplicity, subsequent discussion will refer only to the decommissioning of vehicles. However, the processes and apparatus described may equally be applied to the decommissioning of domestic white goods, etc.

Figure 2 is a block diagram of an apparatus embodying an aspect of the invention, for use in particular at a dismantling facility. The dismantler uses a hand-held RFID (radio frequency identification) tag reader 202 to identify components of the vehicle. The tag reader 202 reads data from the tags attached to the components and passes it to a processing unit or computer 204, where it is checked for validity. The data is used to extract further data from a product database stored on a storage device 206 attached to the processing unit 204. Alternatively, the database may be stored on a remote computer 208 which the processing unit 204 accesses via a local modem 210, a telephone line and a remote modem 212 using a dedicated protocol. As a further alternative, existing protocols and/or networks, e.g. the internet or an intranet, may be used. The further data includes flags which indicate the manner in which a component should be processed, e.g. a flag may be set which indicates that a component is to be considered for reuse. Once the further data has been extracted, some or all of the data may be displayed on a display device 214 connected to processing unit 204. The data which is displayed is dependent upon options selected by the dismantler, but it may include some or all of the following: the chemical composition of the component and/or its material specification, the part identification number, the

assembly relationship of the component with other components of the vehicle, detailed information concerning the shape of the component and/or a three dimensional image of the component and instructions for the removal of the component from the vehicle.

The product database contains complete data relating to all the components of all vehicles, etc, which it is intended should be decommissioned in accordance with the invention. The form of the data is standardized, for example in accordance with ISO standards ISO 10303 and/or ISO 13584 which are standards for the computer-readable representation and exchange of data for products. These standards provide a method of describing product data throughout the life cycle of a product that is independent from any particular computer system. The nature of this description makes it suitable not only for the exchange of data files in a neutral form, but also as a basis for implementing and sharing databases of product data and for the archiving of product data. The use of such a standard ensures that the product data has stability and longevity beyond the time scale of a particular computer system.

In accordance with an embodiment of the invention using the apparatus of figure 2, during the assembly of the vehicle, RFID tags of a known type are attached to several of the components of the vehicle. Each tag is programmed to store data identifying the make and model of the vehicle to which the component belongs and identifying the particular component of the vehicle to which it is to be attached. During the useful life of the vehicle, the tag remains inactive.

Referring to figure 1, when the vehicle is to be decommissioned, as each component is removed from the vehicle at step S2, an RFID tag reader (202 in figure 2) is used by the dismantler to determine whether the component bears an RFID tag (step S4; the word "step" will hereafter be abbreviated to "S"). When a tag is detected, the data stored upon it is read (S6) by the tag reader 202 and its validity is checked (S8), for example using redundancy checking in a known manner. If the data stored on the tag has become corrupt and it is detected that the reply from the tag is found not to be valid then error detection and handling processes are executed (S10, S12). If the data read from the tag is found to be valid then it is used to extract further data (at step S14) relating to the component from a database 16, which may be stored on a data carrier (e.g. CD- or DVD-ROM, etc), on a local computer (204, figure 2) or on a remote computer(208, figure 2).

The information stored on the tag and/or the database 16 and/or the computer program running on a computer 204 at the dismantling facility and/or the computer program running on a computer 208 at a remote facility (if the database is stored and accessed remotely) may comprise data and/or procedures to prevent unauthorised dismantlers from accessing some or all of the additional data on the database 16.

The information stored on the tag and/or the further data extracted from the database 16 may include dismantling instructions, specific to the make and model of the vehicle being dismantled, which the dismantler may use in addition to his

own knowledge of the particular type of vehicle.

If no tag is detected, for example if the tag has been lost or if no tags were attached to components of a particular vehicle during its assembly then a blank tag is attached to the component (S18). The VIN is read from the vehicle (S20) and is used to establish the make and model of the vehicle. Data relating to the type of vehicle is extracted from the database 16. The component is then identified by the dismantler, using visual representations (extracted from the database 16) of components of the vehicle on a computer screen (214 in figure 2). This information is used to derive the data which is to be stored on the tag (S22) and this data is then written (S24). The data is also used at step S14 to extract further data from the database 16 relating to the manner in which the component is to be processed. The component is thereafter treated in a similar manner to already-tagged components.

The tag data and/or the further data extracted from the database 16 is used to create a component identification record (S26) which is stored on a reporting database 28. The identification record may include identification of the vehicle from which the component was removed and the date, time and location of its removal.

The reporting database 28 may be stored on a computer 204 at the dismantling facility or on a remote computer 208. Reports may be generated relating to the efficiency of a dismantling facility, the efficiency of a particular dismantler and other statistics relating to the dismantling process. In particular, the

database may be used to track components to help ensure that components are correctly directed later in the process and to help establish where in the process components are lost or stolen.

The components may then be stored (S30) for example in dedicated storage receptacles (described later). A storage record 32 may be maintained for each component which may be linked to, or contain, the identification record created at S26.

It is likely that components will need to be transported between facilities (S34). The identification records stored on reporting database 28 and/or the storage records 32 for the components may be used to monitor the movement of components between sites (S36), e.g. to ensure that all components leaving one facility and destined for a second in fact arrive at their destination. When components arrive at a facility where they are to be further processed, it may be advantageous to check the tags again (returning to S4).

The components are then separated (at S38). The component identification record stored on reporting database 28 further includes information concerning whether a particular type of component is suitable for reuse or whether the materials from which it is made are suitable for recovery or recycling. Some assemblies, such as the instrument panel of a vehicle, may require further dismantling. At steps S40, S42 and S44, the identification records are checked to establish whether the components require further dismantling, are reusable or are recyclable respectively, and are sent for further processing (at S2, S46 and S48

respectively).

Finally, components which are to be disposed of, for example by being sent to landfill, are treated accordingly (S50).

While components of a class which is often suitable for re-use, e.g. body panels, may have this characteristic shown by default by flags in their identification records, this may be overridden by the dismantler in cases where, for example, the component is rusted or damaged and is therefore not suitable for re-use. Alternatively, this change could be made to the identification record at step S38 when the components are separated, or even later, when normally reusable components have been separated from other components.

In accordance with another embodiment of the invention, the relevant product data may be stored on, and in particular read from, the respective tag rather than from a database 16. In this case, the identification data and the product data may be read from the tag at S6, and step S14 is not required. However, where at S4 it is discovered that a component does not bear a tag, it will still be necessary to obtain the tag data from a database 16.

Figure 3 is a schematic representation of a separating apparatus which operates in accordance with the invention.

The components 302 to be separated are placed on a conveyor belt 304 such that they are longitudinally spaced apart from each other. The components may be placed manually on the belt 304, or the longitudinal spacing may be achieved mechanically in a known manner. The belt 304 carries the components 302 past

an optical sensor 307 which detects in a known manner that an item is on the belt 304 as it breaks a light beam transmitted by a light source 307'. The component 302 is then carried under an arch 306, spanning the belt, which encloses a plurality of conventional RFID tag readers (not visible in the drawing). The data stored on the tag (if present) attached to the component is read and passed to a computer (not shown) which determines the nature of the component 302 as described above with reference to figure 2. The computer further determines how the component 302 is to be further processed and controls deflection means, in the form of conventional directional air knives 308, for example, to deflect the component 302 off belt 304 and into an appropriate receptacle or chute 310.

The deflection means are controlled by the computer (not shown) to direct the components into receptacles or chutes appropriate to the manner in which it is intended that they are to be further processed and/or the materials from which they are made. For example, there may be receptacles or chutes for components which are to be shredded or for components made of a particular alloy.

When the sensor 307 detects an item on the belt 304 but no tag is read by arch 306, the item may be deflected into a receptacle or chute 310' allocated to components which require manual processing. Such items may include components whose tags have been lost or damaged and to which a tag may subsequently be attached, or other items, e.g. operators' gloves, etc.

In addition to the first arch 306, the apparatus may further comprise a second identical arch (not shown) spanning the conveyor belt between the sensor

307 and the first arch 306, or in place of the sensor 307. The second arch is adapted to detect and read tags over a large area of the belt in order to establish the nature of the components which are present on the belt. The first arch 306 is adapted to detect and read tags over a small predetermined area of the belt, e.g. a narrow strip across the belt. With reference to the time at which the tag of a component is first read by the first arch 306 (i.e. the time at which the component enters the predetermined area of the belt within which the first arch is adapted to read tags) and/or the time at which the component leaves that predetermined region, and with reference to the speed of movement of the belt 304 it is possible to estimate the location of the component and a particular instant and the time when the deflection means must be activated in order to deflect the component into the appropriate receptacle or chute 310. For example, when the first arch 306 first reads the tag on the component, it is known that the component is approximately at the upstream limit of the region within which the first arch is adapted to read tags. The deflection means must be activated a period after this detection, the period (in seconds) being approximately equal to the distance between that upstream detection limit and the appropriate receptacle/chute (in metres) and the speed of movement of the belt (in metres per second).

As an alternative, or in addition, to this sorting apparatus, components may be sorted manually by using a tag reader attached to a computer to identify components as described above and to display on a display device attached to the computer an identifier, e.g. a number, identifying which of a number of receptacles

the component should be placed into. The component may then be manually placed into the appropriate receptacle.

At some stage before, during or after separation of the components, they may need to be stored and/or transported. Figure 4 shows a block diagram of a component receptacle in accordance with an aspect of the invention. When components are separated crudely, e.g. into components broadly suitable for reuse, those broadly suitable for recycling and those which are to be disposed of, at least one receptacle 400 may be provided for each group of components. The receptacle 400 comprises a tag reader 402 located adjacent to the entry aperture of the receptacle and past which components being placed into the receptacle pass.

The RFID tag reader is attached to a computer 404 allocated to the receptacle 400. The computer 404 is able, by causing the tag reader 402 to interrogate the RFID tags attached to the components as they are placed into the receptacle, to determine the number and nature of components being placed into the receptacle 400. A remote computer 410 periodically accesses computer 404 (via local and remote modems 406, 408) and determines from it the number of components and/or the type of components and/or the total weight of components stored in the receptacle 400 to which it is allocated. The remote computer 410 uses this information, and information of a similar nature received from other receptacles 400 (at other dismantling facilities, for example) to schedule collections of components from the dismantling facilities and their delivery to shredders, refurbishers, etc. Receptacles 400 may be loaded onto a vehicle and replaced with

an empty receptacle 400.

## CLAIMS

1. A process for dismantling a multi-component product having a remotely machine-readable data tag attached to at least one of the components, the process comprising a plurality of dismantling stages, each of which comprises a step of reading data from, and/or writing data to, the or each tag.

2. A process as claimed in claim 1, wherein the data held on the or each data tag are in a format which is usable by a plurality of different computer systems.

3. A process as claimed in claim 1 or claim 2, wherein some or all of the data on the or each data tag is in a standard format.

4. A process as claimed in any of claims 1 to 3, wherein a common information model to represent data is used at a plurality of stages of the process.

5. A process as claimed in claim 4, wherein the common information model is used at each stage of the process.

6. A process as claimed in any of the preceding claims, wherein the data from a data tag comprises information relating to the identity of the component and/or the intended purpose of the component and/or the materials from which the component is made and/or the shape of the component and/or instructions for removing the component from the product and/or information relating to the processing of the component.

7. A process as claimed in any of the preceding claims, wherein data from a data tag triggers a step of extracting information from a database.

8. A process as claimed in claim 7, wherein the information extracted from the database comprises information relating to the identity of the component and/or the intended purpose of the component and/or the materials from which the component is made and/or the shape of the component and/or instructions for removing the component from the product and/or information relating to the processing of the component.

9. A process as claimed in any of the preceding claims, wherein the or each data tag is read by a method not requiring line-of-sight communication.

10. A process as claimed in claim 9, comprising a step of stimulating a tag to transmit data.

11. A process as claimed in any of the preceding claims, further comprising a step of altering the data held on a data tag.

12. A process as claimed in claim 11, comprising a step of adding data to the data tag.

13. A process as claimed in claim 12, comprising a step of adding data concerning the treatment of a component at a dismantling stage.

14. A process as claimed in any of the preceding claims, wherein the or each data tag comprises a radio frequency identification (RFID) tag.

15. A system for identifying components forming part of a multi-component product having a remotely machine-readable data tag attached to at least one of the components, the system comprising a plurality of dismantling stations, each dismantling station comprising a reading device adapted to read data

from, and/or write data to, the or each tag.

16. A system as claimed in claim 15, wherein the data held on the or each data tag are in a format which is readable by a plurality of different computer systems.

17. A system as claimed in claim 15 or claim 16, wherein some or all of the data on the or each data tag is in a standard format.

18. A system as claimed in any of claims 15 to 17, wherein a common information model to represent data is used at a plurality of dismantling stations.

19. A system as claimed in claim 18, wherein the common information model is used at each dismantling station.

20. A system as claimed in any of claims 15 to 19, wherein the data comprises information relating to the identity of the component and/or the intended purpose of the component and/or the materials from which the component is made and/or the shape of the component and/or instructions for removing the component from the product and/or information relating to the processing of the component.

21. A system as claimed in any of claims 15 to 20, comprising means for extracting information from a database in response to data received from the data tag.

22. A system as claimed in claim 21, wherein the information extracted from the database comprises information relating to the identity of the component and/or the intended purpose of the component and/or the materials from which the

component is made and/or the shape of the component and/or instructions for removing the component from the product and/or information relating to the processing of the component.

23. A system as claimed in any of claims 15 to 22, wherein the reading devices and the data tags are of a type not requiring line-of-sight communication.

24. A system as claimed in any of claims 15 to 23, comprising means for stimulating a data tag to transmit data.

25. A system as claimed in any of claims 15 to 24, comprising means for altering the data held on a data tag.

26. A system as claimed in claim 25, comprising means for adding data to the data tag.

27. A system as claimed in claim 26, comprising means for adding data concerning the treatment of a component at a dismantling station.

28. A system as claimed in any of claims 15 to 27, wherein the or each data tag comprises a radio frequency identification (RFID ) tag.

29. A process for dismantling a multi-component product, substantially as herein described with reference to, and as illustrated in, the accompanying drawings.

30. A system for identifying components forming part of a multi-component product, substantially as herein described with reference to, and as illustrated in, the accompanying drawings.

INVESTOR IN PEOPLE

**Application No:** GB 0021381.9 **Examiner:** Melanie Gee
**Claims searched:** 1-30 **Date of search:** 2 July 2001

# Patents Act 1977
# Search Report under Section 17

**Databases searched:**

UK Patent Office collections, including GB, EP, WO & US patent specifications. in:

UK Cl (Ed.S): G4H (HJ)

Int Cl (Ed.7):

Other: Online: WPI, EPODOC, PAJ, TDB, INSPEC, XPESP

**Documents considered to be relevant:**

| Category | Identity of document and relevant passage | Relevant to claims |
|---|---|---|
| A | EP 0977137 A2 (HITACHI), see whole document. | |
| A | JP 100144148 A (RICOH), see abstract. | |

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